

Laparoscopic Management of Ovarian Dermoid Cysts: Ten Years' Experience

Camran R. Nezhat, MD, Senol Kalyoncu, MD, Ceana H. Nezhat, MD,
Ehrin Johnson, N. Berlanda, Farr Nezhat, MD

ABSTRACT

Objective: To determine the safety and efficacy of laparoscopic management of ovarian dermoid cysts based upon our ten years' experience.

Methods: Charts of 81 patients who underwent laparoscopic removal of dermoid cysts since March 1988 at Stanford University Medical Center or the Center for Special Pelvic Surgery in Atlanta were reviewed retrospectively.

Results: Ninety-three dermoid cysts with a mean diameter of 4.5 cm were removed in 81 patients. Operative techniques used were cystectomy for 70 cysts, salpingo-oophorectomy for 14, and 9 salpingo-oophorectomy with hysterectomy. Fifty-three cysts were treated via enucleation followed by cystectomy or salpingo-oophorectomy and removal through a trocar sleeve. Twenty-two were treated via enucleation and removal within an impermeable sack. Nine were treated via enucleation and removal by posterior colpotomy. Nine were removed via colpotomy following hysterectomy. We had a total of 39 spillages. Spillage rates varied with removal method: 32 (62%) for trocar removal without an endobag, 3 (13.6%) for removal within an endobag, and 4 (40%) with colpotomy removal. No spillage occurred for the nine patients who had a colpotomy done for hysterectomy. Mean hospital stay after surgery was 0.98 days, and there were no intraoperative complications. In one case, there was a postoperative complication of an incisional infection in the umbilicus.

Conclusion: Including this and 13 other studies, review of the literature reveals a 0.2% incidence of chemical peritonitis following laparoscopic removal of dermoid cysts. Thus, we conclude that laparoscopic management of dermoid cysts is a safe and beneficial method in selected patients when performed by an experienced laparoscopic surgeon.

Key Words: Laparoscopy, Dermoid cyst, Ovarian cyst, Operative laparoscopy.

INTRODUCTION

Benign cystic teratomas, or dermoid cysts, are germ cell tumors of the ovary that account for 20-25% of all ovarian tumors and are bilateral in 10-15% of cases.¹ They have a low incidence of malignancy, reported as 1-3%.^{2,3}

The majority of dermoid cysts are asymptomatic and are often discovered incidentally upon pelvic exam. The potential for complications such as torsion, spontaneous rupture, risk of chemical peritonitis, and malignancy usually makes surgical treatment necessary upon diagnosis.

Traditional therapy for a dermoid cyst has been cystectomy or oophorectomy via laparotomy. The laparoscopic approach has become increasingly accepted since 1989.⁴ Because most patients with cystic teratomas are of reproductive age, a conservative approach is ideal; laparoscopy may minimize adhesion formation and thus decrease the chance of compromising fertility.

Since our first publication, an increasing number of surgeons are reporting varied approaches.⁴⁻¹⁶ In this study, we evaluate the safety and efficacy of laparoscopic management of dermoid cysts based on our more than ten years' experience.

MATERIALS AND METHODS

Eighty-one patients with a preoperative diagnosis of unilateral or bilateral dermoid cysts between March 1988 and August 1998, for a total of 93 dermoid cysts, were included in the study. Sixty-one operations were performed at the Center for Special Pelvic Surgery (Atlanta,

Department of Gynecology and Obstetrics, Stanford University School of Medicine, Stanford, CA (Drs. C.R. Nezhat, C.H. Nezhat and F. Nezhat).

Center for Special Pelvic Surgery, Atlanta, GA and Palo Alto, CA (Drs. C.R. Nezhat, C.H. Nezhat, F. Nezhat and Dr. Berlanda).

Stanford Endoscopy Center for Training and Technology, Palo Alto, CA (Drs. C.R. Nezhat, C.H. Nezhat, Kalyoncu, Johnson and F. Nezhat).

Department of Surgery, Stanford University School of Medicine, Stanford, CA (Dr. C.R. Nezhat).

Department of Gynecology and Obstetrics, Division of Gynecologic Oncology, Mt. Sinai School of Medicine, New York, NY (Dr. F. Nezhat).

Address reprints request to: Camran Nezhat, MD, 900 Welch Road, Suite 403, Palo Alto, CA 94304. Fax: (650) 327-2794, E-mail: cnezhat@leland.stanford.edu, Web: <http://www.nezhat.com>

Georgia) and 20 at Stanford University Medical Center (Stanford, California). Patient charts were reviewed for demographic data, chief complaint, past history, preoperative investigation, operative techniques (including evidence of tumor spillage, method of specimen removal, blood loss, and other procedures), operative time, complications, duration of hospital stay, pathology report, and postoperative follow-up. Because this was a retrospective study, it was not necessary to obtain Institutional Review Board (IRB) approval.

All patients had preoperative transvaginal sonography. All operations were performed under general anesthesia with endotracheal intubation. After pneumoperitoneum was achieved, diagnostic laparoscopy was used to thoroughly evaluate the pelvis and upper abdomen. First, peritoneal washing was obtained. Then, ovaries were closely examined for potential gross malignancy. Frozen section was employed for any suspicious lesions on a routine basis to rule out malignancy. Laparoscopic removal of dermoid cysts was performed as described previously.⁴ Briefly, a cleavage plane was created between the cyst and stroma of ovary with hydrodissection, and the cyst was enucleated. We tried to minimize spillage in all cases. If spillage did occur, copious irrigation of the abdominal cavity with approximately 10-12 liters of Ringer's was used to wash out cyst contents.

In the earlier cases, we used two different removal techniques. In the first technique, the cyst contents were aspirated through a 12-gauge laparoscopic needle suction irrigator probe and spillage avoided as much as possible. The emptied cyst was shelled out from the ovary and removed through a trocar sleeve. In the second technique, the cyst was enucleated and then removed through a posterior colpotomy.

Since 1995, however, in most cases, an impermeable sack (Endobag; Ethicon, Somerville, NJ) was used for removal. Using this method, the cyst was placed in an impermeable bag and then aspirated in the bag and removed through a 12 mm suprapubic trocar. After removal, electrocautery, low power CO₂ laser, or a few sutures were often used to invert and approximate the ovarian edges. Suturing was minimized in all cases to reduce postoperative adhesion formation. However, when cyst was large, intraluminal, 40 PDS was utilized to approximate the edges. Conversion to laparotomy was not necessary in any of the operations.

RESULTS

Eighty-one patients underwent surgery for laparoscopic removal of dermoid cysts. The mean patient age was 35.4 years (range 16-60), and the mean parity was 0.70 (range 0-4).

The chief complaint was pelvic pain in 40 patients, abnormal uterine bleeding and pain in 11 patients, and only abnormal uterine bleeding in three patients. Twenty-seven patients were asymptomatic. All but one patient was preoperatively diagnosed by either pelvic exam or transvaginal ultrasound. The one patient not preoperatively diagnosed with a dermoid cyst had one discovered coincidentally with bilateral salpingo-oophorectomy performed due to family history of ovarian cancer. Two of the patients presenting with pain had cyst torsion and were treated with unilateral salpingo-oophorectomy.

Three patients had recurrent dermoid cysts after previous surgery at another center. Two with contralateral recurrence had cystectomy. The other patient had bilateral cysts, only one of which was recurrent; she had salpingo-oophorectomy for the recurring dermoids and cystectomy for the new cyst.

Three pregnant patients were diagnosed with a dermoid cyst during prenatal examination, two at 16 weeks and one at 12 weeks. Cyst removal was performed via aspiration and enucleation followed by removal through a trocar in the first two patients, and via enucleation and removal within an endobag in the third. These three patients have since delivered without complication.

Sixty-nine patients had unilateral cysts (85.2%), and 12 patients had bilateral cysts (14.8%). Varying procedures were performed based on patient age and history. Seventy of the cysts were removed by cystectomy (75%), 14 by salpingo-oophorectomy (15%), and 9 by salpingo-oophorectomy with hysterectomy (10%).

Of the 14 cysts removed via salpingo-oophorectomy, 11 were unilateral, and 3 bilateral. The indications for unilateral salpingo-oophorectomy were possible malignancy due to age (>40) in 8 of 11 patients, torsion in 2, and recurrence in 1. The indications for bilateral salpingo-oophorectomy were postmenopausal status for all three patients. Two wished to preserve their uterus; the other had prior hysterectomy. The indications for hysterectomy were endometriosis (8 cases) or postmenopausal mass (1 case).

Table 1.
Spillage related with different methods of removal for each cyst.

Specimen Removal Method	Number of Cysts Removed	Number of Cysts Spilled (Rates)
Through trocar sleeve without endobag	53	32 (60%)
Through trocar sleeve within an endobag	22	3 (13.6%)
Through colpotomy incision	9	4 (44%)
Through colpotomy done for hysterectomy	9	0
Total	93	39 (42%)

Of the cysts treated via either cystectomy or salpingo-oophorectomy, 53 were removed through the trocar sleeve without an endobag, and 22 were removed within an endobag. Aspiration and morcellation was almost always used inside the impermeable sack to facilitate cyst removal through the trocar sleeve. Nine cysts were removed through a posterior colpotomy. The other nine cysts were removed concomitantly with hysterectomy.

The spillage rate per patient was 48% (39/81 spillages), but the total spillage rate was 42% (39/93 spillages) for the cysts removed. Spillage rates also varied with removal method: 60% (32) for aspiration and removal through a trocar sleeve without an endobag, 44% (4) for colpotomy removal, and 13.6% (3) for removal within an endobag. No spillages were recorded when removal was concomitant with hysterectomy (**Table 1**). Spillage was not correlated with cyst size: mean \pm SD cyst diameter was 4.6 \pm 2.1 cm and 4.3 \pm 2.3 cm for spilled and unspilled cysts, respectively ($p > .05$).

Concomitant surgical procedures consisted of treatment of endometriosis (32), myomectomy (8), treatment of non-dermoid cyst (7), adhesiolysis (2), enterocele repair (2), appendectomy (1), presacral neurectomy (1), bowel resection (1), bilateral tubal reanastomosis (1), and bilateral salpingo neostomy (1).

Mean cyst diameter, blood loss and operative time were 4.5 (range 1-12) cm, 84 \pm 76 mL, and 130 \pm 53 minutes, respectively. Operative time for the 17 patients who had no additional procedures beyond dermoid cyst removal (either by cystectomy or unilateral salpingo-oophorectomy) was 103 \pm 30 minutes. There were no intraoperative complications. Pathological diagnosis identified mature cystic teratomas in all cases.

Overall mean hospital stay was 0.98 (range 0-11) days. Excluding the patient with a bowel resection, who stayed for 11 days, mean stay was only 0.83 (range 0-5) days. All these patients had a hospital stay of less than two days, except for the two cyst torsion cases.

Postoperative follow-up mean was 23.8 (range 0.5-84) months; 12 patients were lost to long-term follow-up. During this period, there was one postoperative complication of an incisional infection at the umbilical trocar site, occurring ten days after surgery. The infection resolved after antibiotic treatment. One patient experienced a recurrent dermoid cyst, treated with salpingo-oophorectomy. Three patients developed non-dermoid ovarian cysts during the follow-up. Two other patients had subsequent surgery unrelated to cyst development: one a hysterectomy, the other a bilateral salpingo-oophorectomy. Seven patients became pregnant during the follow-up period.

DISCUSSION

Spillage of cyst contents, potentially leading to complications such as chemical peritonitis or spread of malignancy, is the most important risk in laparoscopic management of dermoid cysts. Spillage rates in laparoscopy are 15-100%,⁴⁻¹⁶ compared to only 4-13% via laparotomy.¹¹⁻¹³

Excluding case reports, a review of the literature reveals a total of 14 studies, including the present study, documenting 470 laparoscopic dermoid cystectomies. Spillage occurred in 310 cases (66%). Major postoperative complications were seen in only one case,¹¹ with chronic granulomatous peritonitis occurring nine months postoperatively. Taking these results into consideration with the literature, we can conclude that the rate of clinical chemical peritonitis following spillage from laparo-

Table 2.
Spillage rates and major postoperative complications reported following removal of dermoid cysts.

Author	Number of Patients	Number of Spillages	Incidence of Chemical Peritonitis
Nezhat (1989)	9	7 (78%)	0
Reich (1992)	25	11 (44%)	0
Bolan (1992)	14	14 (100%)	0
Chen (1992)	18	15 (83%)	0
Yuen (1993)	6	0	0
Chapron (1994)	56	41 (73%)	0
Mengeshikar (1995)	97	97 (100%)	0
Cristoforoni (1995)	24	8 (33%)	1
Howard (1995)	8	4 (50%)	
Lin (1995)	29	29 (100%)	0
Luxman (1996)	41	6 (15%)	0
Teng (1996)	44	29 (66%)	0
Rosen (1998)	18	10 (56%)	0
Nezhat (present)	81	39 (48%)	0
Total	470	310 (66%)	1 (0.2%)

scopic dermoid cystectomy is 0.2% (**Table 2**). In this series, our spillage rate was 48% per patient, with no cases of clinical chemical peritonitis following surgery. No cases of chemical peritonitis following intraoperative spillage during laparotomy have been recently reported.¹¹⁻¹³

It is possible to aspirate the cyst after placing it intact inside a laparoscopic bag. Our increased use of this technique has significantly reduced the potential for spillage. In this study, the laparoscopic spillage rate for removal within an endobag was 13.6%, a rate comparable with laparotomy.¹¹⁻¹³ When spillage occurs despite precautions, it is of prime importance to copiously irrigate the abdominal cavity with Ringer's lactate to effectively wash out cyst contents.

Another criticism of laparoscopy has been potential implantation of cystic components into the abdominal wall while removing the cyst through the operative channel. There is one case report¹⁷ of implantation leading to fistulization of the bladder and rectum. Careful cyst removal via the trocar sleeve without contacting the abdominal wall obviates this potential complication.

A survey of 156 members of the American Society of Gynecologic Oncologists¹⁸ revealed 42 cases of laparo-

scopic removal of ovarian tumors subsequently found to be malignant. In our follow-up, we did not find any cases of subsequent malignancy. Although it has been reported that malignant ovarian cyst rupture may not affect the prognosis for ovarian cancer,^{19,20} spread of malignancy is still a potential problem for laparoscopic management. Spillage should be avoided as much as possible through careful aspiration or use of an impermeable sack. Postoperative chemotherapy may be used in case of unexpected rupture of a malignant cyst.

Questions concerning diagnosis of dermoid cysts still exist. Ultrasound, especially transvaginal, may assist in diagnosis. However, malignancy is still difficult to exclude with sonography, because dermoid cysts and malignant tumors of the ovary may both have mixed-solid components. Tumor markers such as CA125 are generally helpful but are not enough to diagnose malignancy every time.²¹ For this reason, frozen section of suspicious lesions and excrescencies may be necessary.

One of the advantages of laparoscopic management of dermoid cysts is decreased adhesion formation. In our previous study,⁴ second-look laparoscopy revealed no adhesions in three patients who had spillage, whereas the one patient without spillage had mild periovarian

adhesions. In a study by Chapron et al,⁹ 10 of 56 patients with dermoid cystectomies had second-look laparoscopy. Eight of these ten patients had intraperitoneal spillage, but only two had adhesions upon second-look laparoscopy. Lin¹³ also reported one patient who had second-look laparoscopy after 12 months. Despite spillage during the previous operative course, the patient had minimal adhesions. None of these three studies revealed evidence of granulomatous implants.

Our laparoscopic operative times are comparable with other laparotomy reports. Cristoforoni¹¹ reported operative times for laparotomy of 92 ± 11 minutes. In our study, mean operative time excluding other procedures was 103 ± 30 minutes, a value approaching laparotomy times. As has previously been established, hospital stay, blood loss, patient morbidity, and cosmetic results may be significantly better with laparoscopy compared to laparotomy.

To our knowledge, there are only a few other studies documenting a laparoscopic dermoid cystectomy in a pregnant patient.²²⁻²³ In this study, we report three cases of dermoid cyst removal in a pregnant patient. In two of the cases, there was spillage due to enlarged cyst size and technical difficulties. Postoperative period and delivery was without complication in all three cases.

SUMMARY

Based upon our more than ten years' experience in a total of 90 patients and 102 dermoid cysts, including our first publication,⁴ we believe that laparoscopic management of dermoid cysts may be a safe and beneficial procedure when performed by an experienced surgeon.

References:

1. Peterson WF, Prevost EC, Edmunds FT, Handley JM, Morris FK. Benign cystic teratoma of the ovary: a clinico-statistical study of 1007 cases with review of the literature. *Am J Obstet Gynecol.* 1957;72:1094.
2. Curling OM, Potsides PN, Hudson CN. Malignant change in benign cystic teratoma of the ovary. *Br J Obstet Gynecol.* 1979;86:399-402.
3. Richardson G, Robertson DI, O'Connor ME, Nation JG, Stuart GCE. Malignant transformation occurring in mature cystic teratomas of the ovary. *Can J Surg.* 1990;33:499-503.
4. Nezhat C, Winer W, Nezhat F. Laparoscopic removal of dermoid cysts. *Obstet Gynecol.* 1989;73(2):278-281.

5. Reich H, McGlynn F, Sekel L, Taylor P. Laparoscopic management of ovarian dermoid cysts. *J Reprod Med.* 1992;37(7):640-644.
6. Bollen N, Camus M, Tournaye H, Munck L, Devroey P. Laparoscopic removal of benign mature teratoma. *Hum Reprod.* 1992;7(10):1429-1432.
7. Chen JS, Chu ES, Chen MJ. Operative laparoscopy in benign cystic teratoma of ovary. *Chung Hua I Hsueh Tsa Chih (Taipei).* 1992;50(3):194-197.
8. Yuen PM, Rogers MS. Laparoscopic removal of dermoid cysts using endopouch. *Aust NZ Obstet Gynecol.* 1993;33(4):397-399.
9. Chapron C, Dubuisson JB, Samouh N, et al. Treatment of ovarian dermoid cysts. Place and modalities of operative laparoscopy. *Surg Endosc.* 1994;8(9):1092-1095.
10. Mengeshikar, PR. Laparoscopic management of benign ovarian dermoid cysts. *J Am Assoc Gynecol Laparosc.* 1995 Aug;2(4, Supplement):S28-S29.
11. Cristoforoni P, Palmeri A, Walker D, Gerbaldo D, Lay R, Montz FJ. Ovarian cystic teratoma: to scope or not to scope? *J Gynecol Tech.* 1995;1(3):153-156.
12. Howard FM. Surgical management of benign cystic teratoma. *J Reprod Med.* 1995;40(7):495-499.
13. Lin P. Excision of ovarian dermoid cyst by laparoscopy and by laparotomy. *Am J Obstet Gynecol.* 1995;173(3 Pt 1):769-771.
14. Luxman D. Laparoscopic conservative removal of ovarian dermoid cysts. *J Am Assoc Gynecol Laparosc.* 1996;3(3):409-411.
15. Teng FY, Muzsnai D, Perez R, Mazdisnian F, Ross A, Sayre J. A comparative study of laparoscopy and colpotomy for the removal of ovarian dermoid cysts. *Obstet Gynecol.* 1996;87(6):1009-1013.
16. Rosen D, Lam A, Carlton M, Cario G. The safety of laparoscopic treatment for ovarian dermoid tumors. *Aust NZ Obstet Gynecol.* 1998;38(1):77-79.
17. Keil KH, Julian TM. Trichuria, pneumaturia, urosepsis, and bowel fistulization after pelvoscopic cystectomy of mature ovarian teratoma. *J Gynecol Surg.* 1993;9:235-239.
18. Maiman M, Seltzer V, Boyce J. Laparoscopic excision of ovarian neoplasms subsequently found to be malignant. *Obstet Gynecol.* 1991;77:563-565.
19. Dembo AJ, Davy M, Stanwig AE, Berle EJ, Bush RS, Kjorstad K. Prognostic factors in patients with stage I epithelial ovarian cancer. *Obstet Gynecol.* 1990;75:263-273.
20. Grogan R. Accidental rupture of malignant ovarian cysts during surgical removal. *Obstet Gynecol.* 1967;30:716-720.
21. Nezhat F, Nezhat C, Weiland CE, Benigno B. Four ovarian cancers diagnosed during laparoscopic management of 1011 women with adnexal masses. *Am J Obstet Gynecol.*

1992;167(3):790-796.

22. Morice P, Louis-Sylvestre C, Chapron C, Dubuisson JB. Laparoscopy for adnexal torsion in pregnant women. *J Reprod Med.* 1997;42(7):435-439.

23. Parker W II, Childers JM, Canis M, Phillips DR, Topel H. Laparoscopic management of benign cystic teratomas during pregnancy. *Am J Obstet Gynecol.* 1996;174(5):1499-1501.